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## RAILROAD RATES FROM AN ENGINEERING STANDPOINT.

By Prof. B. J. DALTON, Dallas, Tex.

**O**WING to the agitation that has been going on for some time relative to the reduction of railroad rates, the speaker thought it might be interesting to discuss the question from an engineering standpoint.

First, it is conceded that every man is entitled to a fair rate of interest on money that he may invest in any enterprise, and when that money is invested in railway property, and the railway is economically and judiciously managed, he is entitled to adjust the rates so as to pay a fair profit on the investment.

In order to make an intelligent comparison of the railroads of the country, the Interstate Commerce Commission has divided the United States into ten groups, according to the territory through which they run, since in this manner the density of the population, the topography of the country, and the character of the industries served by the railroads may be taken into account. Then all the roads operating under about the same conditions are placed in one group.

Group VIII, in which we are located, comprises Missouri, Arkansas, Kansas, Oklahoma, the south two-thirds of Colorado, the northeast corner of New Mexico, and the extreme northwest point of Texas.

We will first show how the rates in this group compare with those of the whole United States, and finally how the rates in Kansas compare with those of all the roads in group VIII.

Plate I shows graphically the revenue per passenger per mile in the United States, and in group VIII, from 1890 to 1895, inclusive. It will be observed that for the United States this rate has decreased gradually from 2.167 cents to 1.962 per mile. The curve for group VIII practically runs parallel to the curve for the whole United States and on an average of two-tenths of a cent higher.

This plate also shows the average rates on three of the principal roads in the state of Kansas—the Union Pacific, the Chicago, Rock Island & Pacific, and the Atchison, Topeka & Santa Fe—compared with all the roads in group VIII. It will be observed that for the first few years after 1900 the rates on the individual roads were a

trifle higher than the average rate on those in group VIII, but that since 1905 they have decreased rapidly until, with the report for the year ending June 30, 1908, the average passenger rate was about two cents per mile.

Plate II shows the revenue per ton per mile for all the roads in the United States, and also for those in group VIII. From it one can see that the average for the United States has dropped from ninety-five one-hundredths of a cent per ton per mile, the rate in 1890, to seventy-six one-hundredths of a cent per ton per mile in 1905. Group VIII is about two-tenths of a cent higher, and this rate is about one-twentieth what it would cost to haul by wagon.

Now, comparing the Union Pacific, the Rock Island, and the Santa Fe, in this state, with group VIII, we find about the same conditions existing in the freight rate as in the passenger rate, namely, that the freight rate on the individual roads is about two-tenths of a cent higher than the average for the group until 1905, after which time it begins to drop, and at the present is about ninety-five one-hundredths of a cent per ton per mile. This certainly looks as if it were cheap enough.

We will now turn to the dividends paid on the stock from the earnings due to the above rates. Plate III shows the average dividends paid on the stock of all the roads in the United States, and also in group VIII, beginning with the year 1890 and ending with 1905. From this it will be seen that the railroads have paid dividends of from 4 per cent. to 6 per cent. on all stock since 1901. Taking the same three roads in Kansas, we find that from June 30, 1907, to June 30, 1908, the Santa Fe paid  $5\frac{1}{2}$  per cent. on common and 5 per cent. on preferred, the Union Pacific 10 per cent. on common and 4 per cent. on preferred, and the Rock Island  $5\frac{1}{4}$  per cent. on common.

These figures do not give the actual percentage on the investment, for the reason that the dividend is declared on the face value of the stock and not on the market value. For instance, the present market value of Santa Fe common is about  $97\frac{1}{2}$ , and preferred  $102\frac{1}{2}$ ; Rock Island common is 24, preferred 60; Union Pacific common is 180, preferred 95; so that if a man buys Rock Island common at 24 and receives  $5\frac{1}{2}$  per cent. dividend, he is actually receiving 22.9 per cent. interest on his investment, but if he buys Union Pacific at 180 and receives 10 per cent. dividend, his actual rate of interest will be  $5\frac{1}{2}$  per cent.

1890

1895

1900

1905

1908

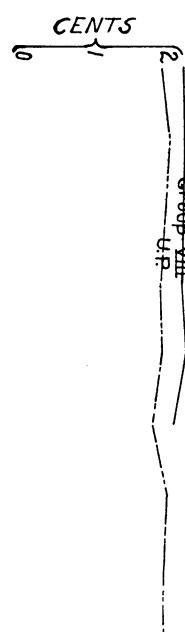
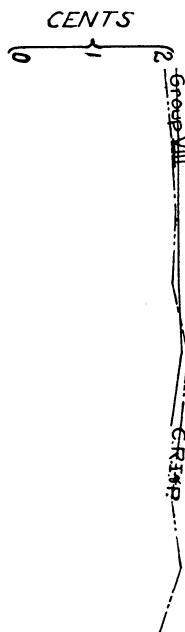
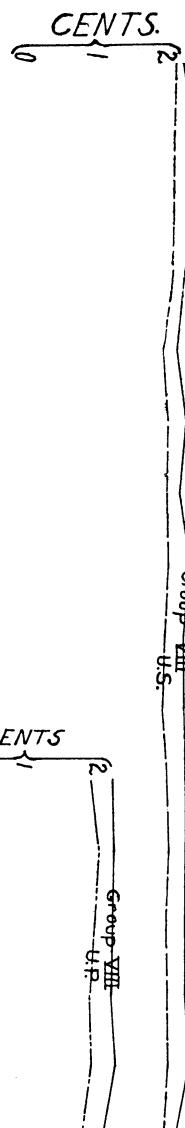


PLATE I.

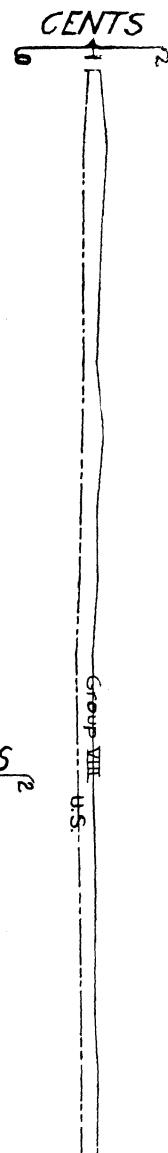
1890

1895

1900

1905

1910



CENTS

CENTS

Group VIII

Group VIII

Group VIII U.S.

PLATE II.

CENTS

CENTS

Group VIII

Group VIII

Group VIII U.S.

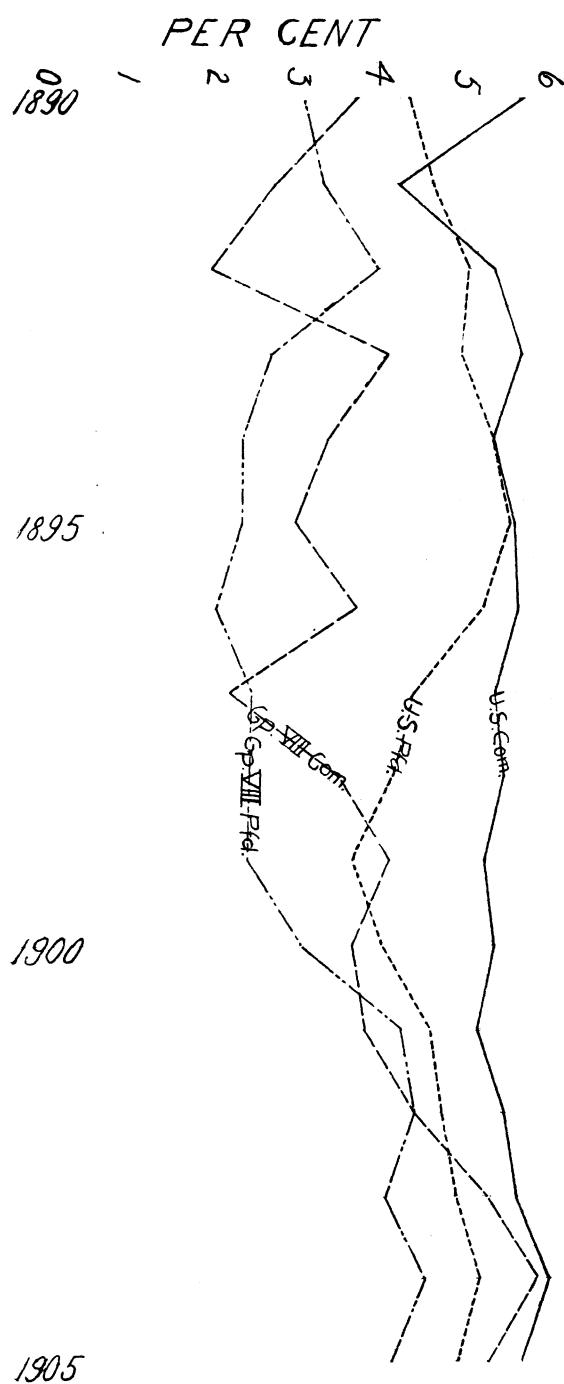
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Group VIII

Group VIII U.S.



The speaker knows of one railroad being built that is bonded for a certain amount per mile, and when a man buys a \$1000 bond he also receives \$400 in common and \$400 in preferred stock, which means that four-ninths, or almost one-half, of the entire capital stock is water.

The nineteenth annual report of the Board of Railroad Commissioners of Kansas gives the entire capital (which is the stock plus all outstanding indebtedness) per mile for the Santa Fe as \$51,474, Rock Island, \$44,196, and the Union Pacific, \$133,535. From these figures one is easily persuaded that all railroad stocks are watered. At this point the question naturally arises, Shall the capital stock of railways and the dividends thereon be limited? If so, to what amount, and what shall become of all earnings in excess of a specified amount?

The speaker can only give his views on this subject, but he believes that they should be limited to an amount such that the money received from the sale of stock and bonds will just be sufficient to build and equip the line. Also, that the minimum price at which the stock and bonds are to be sold should be controlled by the government.

In order to accomplish these things in the simplest manner, I would suggest that all railroads be placed in charge of the federal government, and directly under the Interstate Commerce Commission, and that all state railroad commissions be abolished. Then, before any company could build a new line, or make any improvements on an old line extensive enough to require a bond issue, it should be required to submit to the Interstate Commerce Commission an estimate of the cost of such work. If after a thorough examination by the Commission's engineer this estimate be found correct, then let the company be authorized to issue stock and bonds, or bonds, for a sufficient amount to cover the cost of the work.

If these things were regulated as suggested, so that a prospective bond buyer would know that every dollar he invested in a bond would be used in the construction of the road, he would be much more willing to invest in railway securities.

The Interstate Commerce Commission should be given authority to reduce the capital stock and bond issues to an amount that would cover the actual amount of money invested, or the present physical value, if that be more than the original cost.

This may seem severe, but it is no worse than for the bondholders

to foreclose their mortgage and buy the property at sheriff's sale at a nominal price, and then reorganize the company.

Then the dividends should be limited to three or four per cent. and the surplus revenue used to better the physical condition of the road in order to protect life and facilitate the handling of traffic.

In the year 1905, as a direct result of the movement of trains, locomotives or cars, 533 passengers were killed and 10,245 injured, 341 of whom were killed and 6053 injured in collisions and derailments.

In order to reduce the number of collisions, some of the railways have adopted the block-signal system. This is operated in two ways; the one under what is known as the manual, and the other as the automatic. The manual depends upon telegraph operators for its successful operation. It was under this system, which is in use on the Southern railway, that Mr. Samuel Spencer, the president, lost his life in a rear-end collision on November 29, 1906. Upon investigation it was discovered that an operator had admitted the second train to the block before the president's train had passed out. It also developed that it was a common practice on the eastern roads to run two trains in a block at the same time. The officials claimed that it was necessary to do this in order to handle the traffic.

The automatic system is operated by dividing the track into sections called "blocks." The rails in a block are joined by wires reaching around the splices so as to give a continuous conductor for its full length. The rails at the junction of the two blocks are insulated. Then by an ingenious arrangement of batteries, relays, motors, etc., the semaphore boards are controlled so that when there is no train in the block the current flows through the rails and holds the semaphore at "safety," but as soon as a train enters the block it short-circuits the current by giving a connection between the two rails through the wheels and axles, and the semaphore then goes up to the danger position by the force of gravity. However, there is nothing in this to prevent a second train from passing on into the block excepting orders, which are given to the engineer by the dispatcher.

There is no reason why the automatic system should not be operated in such a way that it would bring the second train to a full stop in case it attempted to enter the block before the semaphore dropped to the safety position. This could be easily accomplished by having a lever which would set the brakes, rise up out of the ground high enough to strike an arm extending from the side of the locomotive or car, and would bring the train to a stand-

still independent of the engineer. Whenever the traffic becomes so great that it cannot be handled without running more than one train in a block it is time to add more tracks.

Many of the derailments are caused by poor track, and could be prevented by proper drainage and ballast.

Very few of the roads have rolling-stock enough to handle the traffic during harvest-time. It is not uncommon for a man to receive a car-load of freight from two to three months after he receives the bill of lading. At times this causes considerable financial loss to the consignee.

In winter the train resistance is much more than it is in the summer, and ordinarily it is unusual for a passenger-train to be on time. I remember one winter night of boarding a train for Kansas City, at Springfield, Mo., and waiting for one hour for two locomotives to start the train. When we did start one locomotive pulled the train into Kansas City, arriving there five hours late. While waiting in the depot for my next train I met a friend who was returning from New York, and he was only four days behind time.

Many of the coaches, and sometimes even the waiting-rooms, are so dirty that they are not fit for a lady to enter.

It seems to the speaker that the rates are as low as the people should ask, but that they should think more of the safety of human life, of convenience to the traveling public, and of the expeditious handling of freight, than of a few cents saved in passenger and freight rates.

The following recommendations are suggested: Abolish all state railroad commissions. Place all railways under the Interstate Commerce Commission, with full authority, first, to limit the capital stock and dividends, and, second, to compel the railways to use all net earnings in excess of dividends in the installation of safety appliances; improve the road-bed; increase the rolling-stock; run additional trains, so as to run them on time; furnish commodious and clean waiting-rooms; permit no railway grade or crossing without an interlocking plant, etc. After a number of years, when all these things have been accomplished, then use the excess in paying off the bonded indebtedness.